STRATEGY FOR RECOVERY

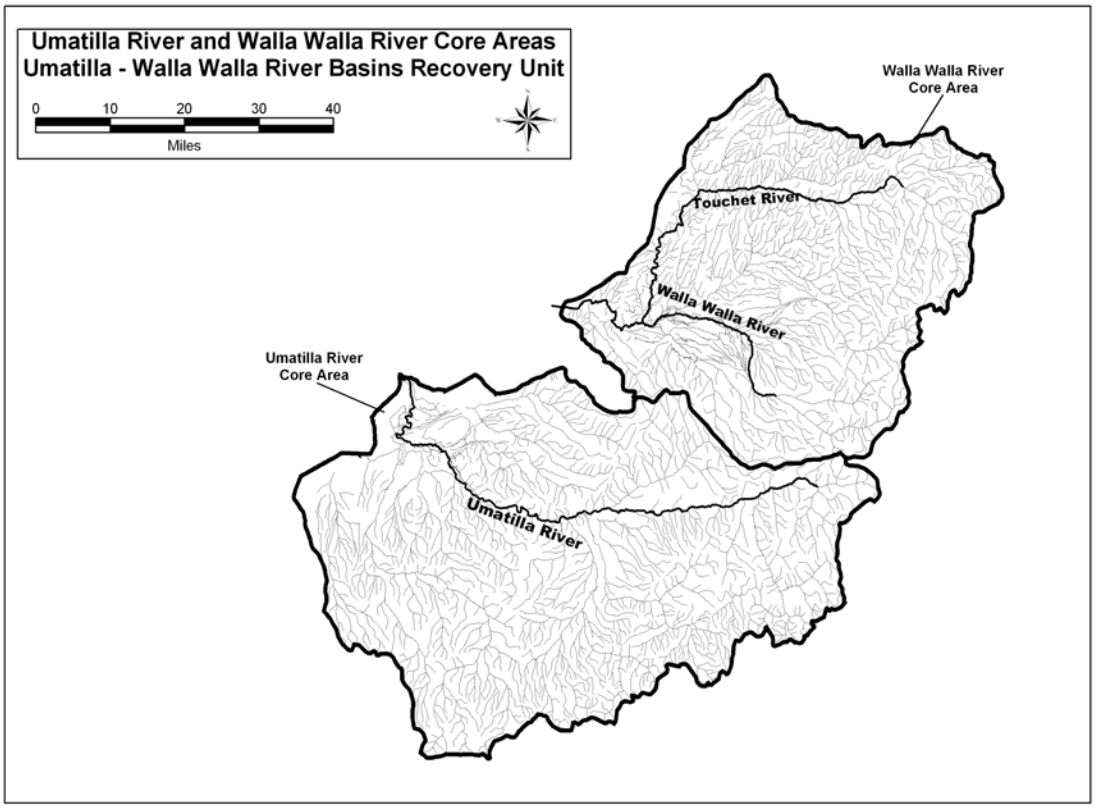
A core area represents the closest approximation of a biologically functioning unit for bull trout. The combination of core habitat (*i.e.*, habitat that could supply all the necessary elements for the long-term security of bull trout, including for both spawning and rearing, as well as for foraging, migrating, and overwintering) and a core population (*i.e.*, bull trout inhabiting a core habitat) constitutes the basic core area upon which to gauge recovery within a recovery unit. Within a core area, many local populations may exist.

Two core areas were defined for the recovery unit, one for the Umatilla Basin and one for the Walla Walla Basin (Figure 5). The Columbia River connecting the two core areas was identified as a research need due to the uncertainty of its current or potential use by bull trout as overwintering and migration habitat.

The Umatilla Core Area includes the local population defined as the North Fork Umatilla complex. It may contain one or more local populations, but until fidelity to natal streams can be documented it is referred to as a complex. The Walla Walla Core Area includes three local populations: the Upper Walla Walla Complex (North Fork and South Fork), Mill Creek and tributaries, and the Touchet River and tributaries. The Touchet population may consist of more than one local population (*e.g.*, North Fork Touchet, South Fork Touchet and Wolf Fork Touchet). For the present, or until research shows otherwise, they are considered one local population, referred herein as the Touchet Complex. The Touchet system has the potential to become a core area if further research shows the populations cannot connect with the rest of the Walla Walla populations.

It is also possible that the two core areas could be redefined as one core area encompassing the entire recovery unit if questions surrounding bull trout use and limiting factors in the lower mainstems of both rivers and in the Columbia River can be answered.

Figure 5. Map of Umatilla-Walla Walla Recovery Unit for bull trout with core areas delineated.



Rieman and McIntyre (1993) and Rieman and Allendorf (2001) evaluated the bull trout population numbers and habitat thresholds necessary for long-term viability of the species. They identified four elements, and the characteristics of those elements, to consider when evaluating the viability of bull trout populations. These four elements are (1) number of local populations; (2) adult abundance (defined as the number of spawning fish present in a core area in a given year); (3) productivity, or the reproductive rate of the population (as measured by population trend and variability); and (4) connectivity (as represented by the migratory life history form and functional habitat). For each element, the Umatilla-Walla Walla Recovery Unit Team classified bull trout into relative risk categories based on the best available data and the professional judgment of the team.

The Umatilla-Walla Walla Recovery Unit Team also evaluated each element under a potential recovered condition to produce recovery criteria. Evaluation of these elements under a recovered condition assumed that actions identified within this chapter had been implemented. Recovery criteria for the Umatilla-Walla Walla Recovery Unit reflect (1) the stated objectives for the recovery unit, (2) evaluation of each population element in both current and recovered conditions, and (3) consideration of current and recovered habitat characteristics within the recovery unit. Recovery criteria will probably be revised in the future as more detailed information on bull trout population dynamics becomes available. Given the limited information on bull trout, both the level of adult abundance and the number of local populations needed to lessen the risk of extinction should be viewed as a best estimate.

This approach to developing recovery criteria acknowledges that the status of populations in some core areas may remain short of ideals described by conservation biology theory. Some core areas may be limited by natural attributes or by patch size and may always remain at a relatively high risk of extinction. Because of limited data within the Umatilla-Walla Walla Recovery Unit, the recovery unit team relied heavily on the professional judgment of its members.

Local Populations. Metapopulation theory is important to consider in bull trout recovery. A metapopulation is an interacting network of local populations with varying frequencies of migration and gene flow among them (Meffe and Carroll 1994) (see Chapter 1). Multiple local populations distributed and interconnected throughout a watershed provide a mechanism for spreading risk from stochastic events. In part, distribution of local populations in such a manner is an indicator of a functioning core area. Based in part on guidance from Rieman and McIntyre (1993), bull trout core areas with fewer than 5 local populations are at increased risk, core areas with between 5 and 10 local populations are at intermediate risk, and core areas with more than 10 interconnected local populations are at diminished risk.

The Umatilla Core Area currently supports one local population and the Walla Walla Core Area currently supports three local populations. Based on the above guidance, bull trout in these core areas are considered to be at increased risk of

extirpation due to stochastic events. Additional local populations are needed to reduce the risk from deterministic or stochastic events which may threaten bull trout.

Adult Abundance. The recovered abundance levels in the Umatilla-Walla Walla Recovery Unit were determined by considering theoretical estimates of effective population size, historical census information, and the professional judgment of recovery team members. In general, effective population size is a theoretical concept that allows us to predict potential future losses of genetic variation within a population due to small population sizes and genetic drift (see Chapter 1). For the purpose of recovery planning, effective population size is the number of adult bull trout that successfully spawn annually. Based on standardized theoretical equations (Crow and Kimura 1970), guidelines have been established for maintaining minimum effective population sizes for conservation purposes. Effective population sizes of greater than 50 adults are necessary to prevent inbreeding depression and a potential decrease in viability or reproductive fitness of a population (Franklin 1980). To minimize the loss of genetic variation due to genetic drift and to maintain constant genetic variance within a population, an effective population size of at least 500 is recommended (Franklin 1980; Soule 1980; Lande 1988). Effective population sizes required to maintain long-term genetic variation that can serve as a reservoir for future adaptations in response to natural selection and changing environmental conditions are discussed in Chapter 1 of the recovery plan.

For bull trout, Rieman and Allendorf (2001) estimated that a minimum number of 50 to 100 spawners per year is needed to minimize potential inbreeding effects within local populations. In addition, a population size of between 500 and 1,000 adults in a core area is needed to minimize the deleterious effects of genetic variation from drift.

For the purposes of bull trout recovery planning, abundance levels were conservatively evaluated at the local population and core area levels. Local populations containing fewer than 100 spawning adults per year were classified as at risk from inbreeding depression. Bull trout core areas containing fewer than 1,000 spawning adults per year were classified as at risk from genetic drift.

Bull trout in the Umatilla Core Area persist at low numbers. Due to the lack of abundance data, bull trout local populations in the South Fork Umatilla and North Fork Meacham Creek could not be evaluated relative to risk of inbreeding depression. Abundance estimates for the North Fork Umatilla local population were calculated based on results of an electrofishing survey and redd counts. In 1998 and 2000, adult population estimates were 192 and 327 individuals, respectively. The recovery unit team further estimated adult abundance in the core area for the year 2000 at 385 individuals. This estimate was based on the assumption that the North Fork Umatilla River contained 85 percent of all bull trout present in the core area. Based on the aforementioned abundance guidance, bull trout in the North Fork Umatilla local population are at a decreased risk of inbreeding depression. In contrast, bull trout in the Umatilla Core Area were classified as at increased risk from deleterious effects of genetic drift. Additional data would be necessary to determine whether bull trout local populations in this core area are at risk of inbreeding depression.

Due to the lack of abundance data, bull trout local populations in the Walla Walla Core Area could not be evaluated relative to the risk of inbreeding depression. Abundance estimates for the Walla Walla Core Area were conservatively estimated by doubling the number of redds counted in 1999 (767) and 2000 (670) and taking the average of both years for an estimate of 1,437 individuals. Based on the above guidance, bull trout in the Walla Walla Core Area are not at risk from genetic drift.

Productivity. A stable or increasing population is a key criterion for recovery under the requirements of the Endangered Species Act. Measures of the trend of a population (the tendency to increase, decrease, or remain stable) include population growth rate or productivity. Estimates of population growth rate (*i.e.*, productivity over the entire life cycle) that indicate a population is consistently failing to replace itself also indicate an increased risk of extinction. Therefore, the reproductive rate should indicate that the population is replacing itself, or growing.

Since estimates of the total population size are rarely available, the productivity or population growth rate is usually estimated from temporal trends in indices of abundance at a particular life stage. For example, redd counts are often used as an index

of a spawning adult population. The direction and magnitude of a trend in the index can be used as a surrogate for the growth rate of the entire population. For instance, a downward trend in an abundance indicator may signal the need for increased protection, regardless of the actual size of the population. A population that is below recovered abundance levels, but that is moving toward recovery, would be expected to exhibit an increasing trend in the indicator.

The population growth rate is an indicator of probability of extinction. This probability cannot be measured directly, but it can be estimated as the consequence of the population growth rate and the variability in that rate. For a population to be considered viable, its natural productivity should be sufficient for the population to replace itself from generation to generation. Evaluations of population status will also have to take into account uncertainty in estimates of population growth rate or productivity. For a population to contribute to recovery, its growth rate must indicate that the population is stable or increasing for a period of time. Based on the depressed or variable populations trend bull trout in the Umatilla and Walla Walla Core Areas were considered at increasing risk.

Connectivity. The presence of the migratory life history form within the Umatilla-Walla Walla Recovery Unit was used as an indicator of the functional connectivity of the recovery unit and both core areas. If the migratory life form was absent, or if the migratory form is present but local populations lack connectivity, the core area was considered to be at increased risk. If the migratory life form persists in at least some local populations, with partial ability to connect with other local populations, the core area was judged to be at intermediate risk. Finally, if the migratory life form was present in all or nearly all local populations, and had the ability to connect with other local populations, the core area was considered to be at diminished risk. Migratory bull trout still persist in some local populations in the Umatilla and Walla Walla Core Areas and therefore are considered at an intermediate risk.

Recovery Goals and Objectives

The goal of the bull trout recovery plan is to **ensure the long-term persistence of self-sustaining, complex, interacting groups of bull trout distributed throughout the species' native range, so that the species can be delisted.** To achieve this goal the following objectives have been identified for bull trout in the Umatilla-Walla Walla Recovery Unit:

- Maintain the current distribution of bull trout within the core areas and re-establish bull trout in previously occupied habitats.

- Maintain stable or increasing trends in abundance of bull trout in the Umatilla-Walla Walla Recovery Unit.

- Restore and maintain suitable habitat conditions for all bull trout life history stages and strategies.

- Conserve genetically diverse populations of bull trout populations within the Umatilla-Walla Walla Recovery Unit.

Recovery Criteria

Recovery criteria identified for the Umatilla-Walla Walla Recovery Unit are as follows.

1. **Bull trout are distributed among six or more local populations in the recovery unit, three in the Umatilla Core Area and three or more in the Walla Walla Core Area.** In a recovered condition the Umatilla Core Area would include the North Fork Umatilla, South Fork Umatilla, and North Fork Meacham Creek local populations. In the Walla Walla Core Area local populations would include the upper Walla Walla Complex, Mill Creek, and the Touchet Complex.

2. **Estimated abundance of adult bull trout is a range between 3,500 and 10,000 individuals in the recovery unit distributed in each core area as follows: Umatilla Core Area from 500 to 5,000; and Walla Walla Core Area from 3,000 to 5,000.** The recovered abundance range was derived using the professional judgement of the team and estimation of productive capacity of identified local populations.

   Increased population abundance in the Umatilla Core Area is expected to occur by securing the distribution in the North Fork Umatilla, securing and expanding seasonal distribution in the mainstem Umatilla, and expansion of populations to additional subbasins such as Meacham and South Fork Umatilla.

   In the Walla Walla Core Area, increased population abundance is expected to occur within existing population complexes. We do not know at this time how many adult bull trout occur in the North Fork Walla Walla River. There is potential to expand population abundance in the Touchet River subbasin. Spawning habitat in the Wolf Fork Touchet needs to be protected, and in the North Fork Touchet it needs to be protected and expanded. There are opportunities to protect and expand year round rearing and migration habitat in the upper Touchet subbasin on private, Tribal and public lands.

3. **Adult bull trout exhibit a stable or increasing trend in abundance for at least two generations at or above the recovered abundance level within the recovery unit.** Achievement of this recovery criteria will be based on a minimum of 10 years of monitoring data.

4. **Specific barriers inhibiting bull trout movement in the Umatilla-Walla Walla Recovery Unit have been addressed.** Passage barriers within each core area are addressed, ensuring opportunities for connectivity among local populations within each core area. In the Umatilla Core Area this means addressing thermal and low flow barriers in the mainstem and Meacham Creek, and potential passage barriers to bull trout at Feed Canal and Three Mile Dam. In the Walla Walla Core Area this means addressing flow issues downstream of Nursery Bridge on the

mainstem Walla Walla River, ensuring the ladder at Nursery Bridge will successfully pass bull trout, screening diversions that impact bull trout, and addressing screen needs identified in Appendix A and others identified through implementation of tasks 1.2.1 and 1.2.2. On Mill Creek, barriers addressed include addressing take of bull trout at the City of Walla Walla intake dam and ensuring bull trout have the opportunity to access the Walla Walla River. In the Touchet subbasin barriers addressed include passage at Hoffer Dam and Dayton ponds, and a limiting factors analysis should be conducted to determine whether there is at least seasonal connectivity between local populations and the mainstem Walla Walla River.

Connectivity between core areas via the Columbia River may become an important factor in their recovery. However, additional monitoring and research is needed to assess that importance.

Identification of these barriers does not imply that other actions associated with passage and habitat degradation are not crucial for recovery to occur. To achieve recovery in the Umatilla-Walla Walla Recovery Unit, all four recovery criteria (local populations, abundance, population trends, and barrier removal) must be achieved. It is likely that meeting all four recovery criteria will not be accomplished by removing only these barriers.

The Umatilla-Walla Walla Recovery Unit team expects that the recovery process will be dynamic and will be refined as more information becomes available. While removal of bull trout as a species under the Endangered Species Act (*i.e.*, delisting) can only occur for the entity that was listed (Columbia River Distinct Population Segment), the recovery unit criteria listed above will be used to determine when the Umatilla-Walla Walla Recovery Unit is fully contributing to recovery of the population segment.

Research Needs

Based on the best scientific information available, the recovery unit team has identified recovery criteria and actions necessary for recovery of bull trout within the Umatilla-Walla Walla Recovery Unit. However, the recovery unit team recognizes that many uncertainties exist regarding bull trout population abundance, distribution, and recovery actions needed. The recovery team feels that if effective management and recovery are to occur, the recovery plan for the Umatilla-Walla Walla Recovery Unit should be viewed as a "living" document, to be updated as new information becomes available. As part of this adaptive management approach, the recovery unit team has identified essential research needs within the recovery unit.

The Columbia River. A primary research need is a complete understanding of the current and future role that the mainstem Columbia should play in the recovery of bull trout. It seems likely that fluvial bull trout occurred seasonally in the mainstem Columbia River and may have, and may still, use the Columbia for part of their life history strategy. It is essential to establish with greater certainty the current bull trout distribution and seasonal use areas within the Umatilla-Walla Walla Recovery Unit. To this end, the recovery unit team recommends the development and application of a scientifically accepted, statistically rigorous, standardized protocol for determining present distribution of bull trout. Application of such a protocol will improve the recovery unit team's ability to identify additional core areas, or revise the current classification.

Specifically, tributaries where isolated or where anecdotal reports of bull trout capture have occurred, should be targeted to clarify bull trout distribution within the recovery unit. These areas include, but are not limited to, North Fork Walla Walla watershed, the Touchet River watershed, the Meacham Creek watershed, and the South Fork Umatilla watershed.

McNary Dam on the Columbia River could be a barrier to bull trout, although it is laddered and passes anadromous species. Incidental catch has only been recorded in the Fish Passage Center database since 1997 and there is no record of use by bull trout.

Prior to 1997, a bull trout sighting could have been noted as a "comment", but would not have been recorded in the database. Records prior to 1997 need to be examined for any documentation of bull trout in the comments sections. Operation of the reservoir may affect bull trout by increasing the potential for entrainment and impeding migration. The extent of bull trout use in the Columbia River in the vicinity of McNary Dam needs to be determined. Passage facilities and reservoir operations at McNary may need to be evaluated as to their suitability for bull trout.

Estimated Date of Recovery

Expected time necessary to achieve recovery will vary among recovery units due to differences in bull trout status, factors affecting bull trout, implementation and effectiveness of recovery tasks, and responses to recovery tasks. A tremendous amount of work will be required to restore impaired habitat, reconnect habitat, and eliminate threats from nonnative species. Three to five bull trout generations (15 to 25 years), or possibly longer, may be necessary before identified threats to the species can be significantly reduced and bull trout can be considered eligible for delisting. In the Umatilla-Walla Walla Recovery Unit bull trout currently exist in very numbers in some local populations, and degradation and fragmentation of bull trout habitat presents significant migratory challenges for fluvial fish. Ultimately, these threats must be addressed in the near future if recovery will be achieved.

ACTIONS NEEDED

Recovery Measures Narrative

In this chapter and all other chapters of the bull trout recovery plan, the recovery measures narrative consists of a hierarchical listing of actions that follows a standard template. The first-tier entries are identical in all chapters and represent general recovery tasks under which specific (*e.g.*, third-tier) tasks appear when appropriate. Second-tier entries also represent general recovery tasks under which specific tasks appear. Second-tier tasks that do not include specific third-tier actions are usually programmatic activities that are applicable across the species' range; they appear in *italic type*. These tasks may or may not have third-tier tasks associated with them; see Chapter 1 for more explanation. Some second-tier tasks may not be sufficiently developed to apply to the recovery unit at this time; they appear in *a shaded italic type (as seen here)*. These tasks are included to preserve consistency in numbering tasks among recovery unit chapters and intended to assist in generating information during the comment period for the draft recovery plan, a period when additional tasks may be developed. Third-tier entries are tasks specific to the Umatilla-Walla Walla Recovery Unit. They appear in the implementation schedule that follows this section and are identified by three numerals separated by periods.

The Umatilla-Walla Walla Recovery Unit chapter should be updated or revised when recovery tasks are accomplished, environmental conditions change, or monitoring results or other new information becomes available. Revisions to the Umatilla-Walla Walla Recovery Unit chapter will likely focus on priority streams or stream segments within core areas where restoration activities occurred, and habitat or bull trout populations have shown a positive response. The Umatilla-Walla Walla recovery unit team should meet annually to review annual monitoring reports and summaries, and make recommendations to the U.S. Fish and Wildlife Service.

1 Protect, restore, and maintain suitable habitat conditions for bull trout.

1.1 Maintain or improve water quality in bull trout core areas or potential core habitat.

1.1.1 Investigate extent of sediment input from road network in North Fork Meacham Creek watershed.

1.1.2 Investigate options to reduce effects of the County road in the Umatilla River and tributaries from Meacham Creek to the forks. Take action based on findings.

1.1.3 Assess sediment inputs in the Umatilla Core Area. For example inputs from roads and trails should be evaluated for impacts to bull trout in the North Fork Umatilla and South Fork Umatilla watersheds. Take action based on findings.

1.1.4 Assess sediment sources/inputs in the Walla Walla Core Area. For example, work with Natural Resource Conservation Service to explore the source of sediment in Flume Canyon (South Fork Walla Walla) and actions to address the problem; assess the extent of impacts to bull trout from motorized and non-motorized use of the access trails to the South Fork Walla Walla River during certain times of the year. Take action based on findings. Coordinate with Boise Cascade, Inc. on sediment monitoring plans in Elbow Canyon.

1.1.5 Determine feasibility of trail relocation on U.S. Forest Service and U.S. Bureau of Land Management managed lands in the Walla Walla Basin. Take action based on findings.

1.1.6 Address road issues in the Touchet subbasin. For example, (1) repair culvert on Tate Creek (upper Wolf Fork) to keep the creek from running down the road, (2) close or eliminate fords on the Wolf Fork Touchet, (3) reduce Bluewood road impacts and water

quality issues (NF Touchet), and repair or replace the culvert at Bluewood turnoff and in Corral Creek on the Umatilla National Forest.

1.1.7 Take corrective action and/or provide programs to address sediment inputs and waste dumping in storm drains in the mainstem Walla Walla River.

1.1.8 Improve storm runoff system in Milton-Freewater. Monitor discharge from Milton-Freewater drain pond for toxic substances, sediment, etc., and if necessary, take action to prevent toxics from entering the Walla Walla River.

1.1.9 Investigate source of increased phosphate levels in South Fork Walla Walla River on U.S. Bureau of Land Management land. Take action based on findings.

1.1.10 Investigate extent of water quality problems associated with residences (septic discharges) along the river in the Umatilla Core Area on bull trout streams. Take action based on findings.

1.1.11 Assess water quality with regard to temperature and suitability for bull trout in the Walla Walla Basin. Develop goals to decrease temperature. This action will be addressed through the Walla Walla Total Maximum Daily Load processes in Oregon and Washington currently underway.

1.1.12 Assess extent of chlorine and other chemical inputs into Mill Creek from City of Walla Walla sewer treatment plant and related irrigation use and their impacts to bull trout. Take corrective action.

1.1.13 Assess, and remedy where necessary, significant sources of thermal effluent. For example, assess the fish holding facility on the South Fork Walla Walla and the City of Walla Walla wastewater treatment plant. If necessary revise discharge permits to meet Total Maximum Daily Load allocations.

1.1.14 Assess and minimize effects on bull trout from point and nonpoint source pollution. For example, in Oregon this is an issue that will be dealt with on agricultural lands under Senate Bill 1010 and Total Maximum Daily Load management plans. Implement the Umatilla Total Maximum Daily Load urban and industrial work group management plan.

1.1.15 Identify site-specific threats that may be limiting bull trout in watersheds not already evaluated. For example, other water quality parameters (toxic substances, sediment) not addressed in the Total Maximum Daily Load process in Walla Walla Core Area.

1.2 Identify barriers or sites of entrainment for bull trout and implement tasks to provide passage and eliminate entrainment.

1.2.1 Inventory screen needs in the Walla Walla Core Area in Washington. List priorities for action and implement screen projects. Use the voluntary Washington Department of Fish and Wildlife Cooperative Compliance Review Program to identify and properly screen diversions.

1.2.2 Screen pumps in the Walla Walla subbasin in Oregon. Of the irrigation and domestic pumps inventoried by Oregon Water Resources Department, 80 percent are currently screened. Depending upon available Mitchell Act funding the Walla Walla Basin Council may assist with funding for the remaining pumps.

1.2.3 Investigate options for screening on Smith Ditch with Little Walla Walla Irrigation District. Implement options that result in benefit to bull trout.

1.2.4 Investigate and install screens at Bennington Lake appropriate to handle flood flows to prevent bull trout entrainment in Bennington Lake during floods. Evaluate installation of a trash barrier at Bennington Diversion Dam.

1.2.5 Investigate adequacy of Bennington ladder for upstream migration. Incorporate a fish trap to monitor the fish movements and abundance upstream through the dam.

1.2.6 Establish connectivity in the Walla Walla mainstem and prevent stranding (Garrison/Yellowhawk/Mill Creek channel complex). There is insufficient flow to support fish habitat in all three streams during the summer and many passage barriers in Garrison Creek and Yellowhawk Creek. Yellowhawk and Mill Creeks should be considered for passage and rearing enhancement.

1.2.7 Investigate and implement remediation of diversions and irrigation efficiency improvements to benefit bull trout with increased instream flows and decreased barriers. One example is the proposed relocation of the Milton ditch diversion. Substantial savings in water conservation and fish passage can be achieved by completion of this project.

1.2.8 Implement repairs to Hofer Dam ladder. Juvenile and adult passage facilities are not adequate to pass bull trout and improve opportunities for connectivity for Touchet River bull trout.

1.2.9 Improve passage at Dayton Steelhead Acclimation Pond Dam for bull trout. Bull trout passage is impeded during steelhead

trapping which delays their migration into the upper Touchet subbasin.

1.2.10 Remove passage barrier at Feed Canal/Cold Springs Diversion on the Umatilla River. This project has been designed and is awaiting funding.

1.2.11 Investigate possible impacts to bull trout with downstream passage at Three-mile Dam. Passage facilities were not designed for bull trout and may pose passage problems for adult bull trout.

1.2.12 Review existing barrier lists in the Umatilla subbasin and determine which barriers affect or are likely to affect bull trout and implement remedial actions. Lists generated by the Confederated Tribes of the Umatilla Indian Reservation list and in the Umatilla Subbasin Summary should be included.

1.2.13 Continue monitoring for passage barriers in the Walla Walla Core Area and identify necessary remedial actions as needed.

1.2.14 Monitor new ladder and screen modifications at Mojonnier Dam. Develop an operations and maintenance plan for the facilities.

1.2.15 Implement long-term solution to fish mortality problems at the City of Walla Walla Intake Dam on Mill Creek and monitor for effectiveness.

1.2.16 Implement Titus ditch/diversion project (screens and passage).

1.2.17 Complete ongoing culvert and other transportation related assessments and implement solutions where barriers affect bull trout.

1.2.18 Support City of Pendleton's effort to convert from springs at Squaw Creek to Umatilla River at Pendleton for its water supply. Encourage floodplain connection at new point of diversion (breach dike) and at springs. Cold spring water would then be available to reduce temperatures in the mainstem Umatilla and improve habitat for bull trout.

1.2.19 Investigate potential to increase instream flows. For example, promote use of Conserved Water Program (OWRD), Trust Water Rights Program (WDNR), programs of the Oregon Water Trust, the Oregon Water Resources Department upriver management program for the Walla River, and irrigation district water conservation activities. Work with towns, cities, and counties to address water conservation to increase instream flows.

1.2.20 Investigate the ground-water surface water connection in the Walla Walla Basin. Work with water management agencies to address groundwater withdrawal affecting instream flows. Evaluate effects of historical gravel removal downstream of Nursery Bridge.

1.2.21 Improve instream flows for salmonids in the Walla Walla Core Area. Work with the U.S. Army Corps of Engineers on the Columbia River exchange program.

1.2.22 Continue bull trout salvage program until a long-term solution to insufficient instream flows is found. Improve coordination for fish salvage at all ditches.

1.3 Identify impaired stream channel and riparian areas and implement tasks to restore their appropriate functions.

1.3.1 Identify opportunities and incentives to revegetate areas in riparian zones. Areas identified in the Walla Walla Core Area in need of riparian area reforestation include (1) the South Fork Walla Walla from Harris Park downstream, (2) the North Fork Walla Walla, (3) the mainstem Walla Walla, and (4) Mill Creek from the City Intake dam downstream to the mouth.

1.3.2 Investigate opportunities for riparian restoration behind flood control dikes (outside the channel). Large trees provide the best opportunity to contribute shade to the stream channel from behind the dikes. Work with urban and semi-rural landowners to restore riparian cover behind dikes in upper Mill Creek and upper Touchet River.

1.3.3 Evaluate and improve methods used for flood repair in the Walla Walla and Umatilla Core Areas. Work with relevant agencies and landowners to use flood repair activities that do not adversely harm bull trout or their habitat.

1.3.4 Restore floodplain function and channel complexity in the Umatilla Core Area. For example, pulling back the dike downstream of Pendleton and altering the dike in the mainstem Meacham Creek would improve channel complexity and improve fish habitat and potential use by bull trout. Explore development and use of incentives.

1.3.5 Protect flood prone areas from re-development in the mainstem Umatilla River from Meacham Creek to the forks of the Umatilla River. Investigate and pursue options for habitat protection such as conservation easements, and the Umatilla County (Oregon) buyout program.

1.3.6 Evaluate problems and identify solutions to restore channel complexity in the lower 4.8 kilometers (3 miles) of the South Fork Umatilla River. Conduct a detailed stream survey.

1.3.7 Reduce channel constrictions in the South Fork Walla Walla River between the U.S. Forest Service boundary and Harris Park. Explore alternatives to bridge abutments that constrict the channel.

1.3.8 Evaluate alternative access for cabin owners in the South Fork Walla Walla between National Forest boundary and Harris Park and the upper South Fork Touchet.

1.3.9 Identify and promote incentives and programs to restore floodplain function and channel complexity in the Walla Walla Core Area. For example, South Fork Walla Walla River from Harris Park downstream to the forks, mainstem Walla Walla, and Mill Creek from the City intake dam downstream to the confluence with the Walla Walla River.

1.3.10 Improve instream habitat between Division and Bennington Diversions in Mill Creek and in the Touchet River above Dayton and downstream to Waitsburg. Focus on the weir section.

1.3.11 Increase instream habitat by restoring recruitment of large woody material or other means.

1.3.12 Reduce grazing impacts. Use current proven technology, (*e.g.*, fencing, changes in timing and use of riparian pastures, off-site watering and salting, etc.), to reduce grazing impacts in the mainstem Umatilla to Meacham Creek and in Meacham Creek.

1.3.13 Evaluate enforcement of existing livestock grazing regulations to reduce unauthorized livestock use on the National Forest in the North Fork Meacham Creek.

1.3.14 Explore solutions for improving migratory habitat in the Meacham Creek subbasin with Union Pacific Railroad.

1.3.15 Explore long-term solutions for restoration of flows at Nursery Bridge. Continue to work with irrigation districts toward development of a Habitat Conservation Plan or other long-term solution to insufficient instream flows.

1.3.16 Develop a team of biologists and hydrologists to determine appropriate instream flows within reaches of the Walla Walla Core Area. Provide optimal minimum stream flow values for bull trout on a monthly basis to diversion operators. Identify probable low-flow scenarios and prepare an operational plan encompassing all diversions along length of affected channels to minimize impacts.

1.4 Operate dams and diversions to minimize negative effects on bull trout in reservoirs and downstream.

1.4.1 Review City of Walla Walla and Bureau of Reclamation operations (water level manipulation, entrainment, minimum flows, etc.) in Mill Creek and the Walla Walla River. Provide operating recommendations (Federal Energy Regulatory Commission relicensing process and/or Federal consultation).

1.4.2 Provide adequate flows for fish passage below diversion dams.

1.5 Identify upland conditions negatively affecting bull trout habitats and implement tasks to restore appropriate functions.

1.5.1 Assess current and historic effects of upland management on changes to the hydrograph. For example, review the timing and magnitude of peak flows in the Umatilla from Meacham Creek to the forks of the Umatilla River and in the Meacham Creek drainage.

1.5.2 Review fire suppression methods. Continue implementation of prescribed fire on south facing slopes, and investigate use of prescribed fire on north facing slopes to reduce risk of catastrophic fire within the watersheds draining the North Fork Umatilla River.

1.5.3 Investigate use of prescribed fire to mimic natural disturbance to reinvigorate forest in South Fork Umatilla River above the lower 4.8 kilometers (3 miles) and in Shimmiehorn Creek.

2 Prevent and reduce negative effects of non-native fishes and other non-native taxa on bull trout.

2.1 Develop, implement, and enforce public and private fish stocking policies to reduce stocking of non-native fishes that affect bull trout.

2.2 Evaluate enforcement of policies for preventing illegal transport and introduction of nonnative fishes.

2.3 Provide information to the public about ecosystem concerns of illegal introductions of nonnative fishes.

2.3.1 Design and implement an educational effort about the problems and consequences of unauthorized fish introductions in the Umatilla and Walla Walla Core Areas.

2.4 Evaluate biological, economic, and social effects of control of non-native fishes.

2.4.1 Evaluate site-specific biological, economic, and social impacts of nonnative fish species on bull trout. In Washington, priority nonnative species include brown trout and smallmouth bass. In Oregon, priority nonnative species include largemouth bass and smallmouth bass in the Umatilla River and crappie in the Walla Walla River.

2.5 Implement control of nonnative fishes where found to be feasible and appropriate.

2.5.1 Implement management actions to reduce nonnative fishes where bull trout will benefit and where appropriate. In Washington those species include brown trout and smallmouth bass. In Oregon those species include largemouth and smallmouth bass in the Umatilla, and crappie in the Walla Walla River.

2.6 Develop tasks to reduce negative effects of nonnative taxa on bull trout.

3 Establish fisheries management goals and practices compatible with bull trout recovery and implement practices to achieve goals.

3.1 Develop and implement State and tribal native fish management plans integrating adaptive research.

3.1.1 Incorporate bull trout recovery actions into State and regional plans. Plans include, but are not limited to, The Oregon Plan for Salmon and Watersheds, Washington's Statewide Strategy to Recovery Salmon, Washington Fish and Forests Plan, Pacific Northwest Power Planning Council Subbasin plans, the Walla Walla River Bi-State Habitat Conservation Strategy, and local

watershed council action plans. Request assistance with implementation of recovery strategies for bull trout through these plans.

3.1.2 Coordinate bull trout recovery with recovery efforts, management plans, etc. for other species. For example coordinate with ongoing efforts to restore chinook salmon and summer steelhead such as the Oregon Plan for Salmon and Watersheds monitoring program.

3.2 Evaluate and prevent over harvest and incidental angling mortality of bull trout.

3.2.1 Maintain bull trout protection as high priority for Oregon's Cooperative Enforcement Program and Washington Department of Fish and Wildlife enforcement division. Implement enforcement provisions in the Washington State Bull Trout Management Plan. Target enforcement in the South Fork Walla Walla River from Harris Park upstream, in the mainstem Walla Walla River at Nursery Bridge and Cemetery Bridge; in upper Mill Creek and in the Touchet River above Dayton and North Fork Touchet Rivers.

3.2.2 Conduct additional patrols during vulnerable times such as spawning, and coordinate these among agencies. Possible agencies include Oregon State Police, Washington Department of Fish and Wildlife, and the Confederated Tribes of the Umatilla Indian Reservation.

3.2.3 Review and improve disincentives to illegal harvest of bull trout. Work with State enforcement agencies in Oregon and Washington, as well as the Walla Walla and Umatilla watershed councils to provide information to the judiciary, (*i.e.*, District

Attorneys, judges, etc.), about bull trout and develop better disincentives to illegal harvest.

3.2.4 Provide information to the public about bull trout identification and special regulations. Develop interpretive signs for day use areas, posters, newspaper articles on bull trout identification, life history, and fishing regulations. Develop educational material in English and Spanish languages. Target key spawning/rearing and resident adult areas for education effort (*e.g.*, South Fork Walla Walla River at Harris Park, the Bureau of Land Management trailhead, the upper Touchet drainage, and upper Mill Creek). Pursue cooperation on education projects with the U.S. Forest Service, Bureau of Land Management, Oregon Department of Fish and Wildlife, Washington Department of Fish and Wildlife, Washington State University Center for Environmental Education, County parks, angler and other recreational organizations (*e.g.*, Tri-State Steelheaders), and local newspapers.

3.2.5 Explore with owners the feasibility of interpretive signs at the Bar M Ranch on the mainstem Umatilla (Reach IV).

3.3 Evaluate potential effects of introduced fishes and associated sport fisheries on bull trout recovery and implement tasks to minimize negative effects on bull trout.

3.4 Evaluate effects of existing and proposed fishery regulations on bull trout.

3.4.1 Improve and implement fisheries management guidelines and policies designed to protect native species. Examples include the Oregon Draft Native Fish Conservation Policy, Washington State Bull Trout Management Plan, etc.

4 Characterize, conserve, and monitor genetic diversity and gene flow among local populations of bull trout.

4.1 Incorporate conservation of genetic and phenotypic attributes of bull trout into recovery and management plans.

4.1.1 Determine genetic relationships between bull trout populations in the Umatilla-Walla Walla Recovery Unit. Samples have been collected from adults in the Walla Walla Basin in Oregon and Washington and are being analyzed by Washington Department of Fish and Wildlife genetics lab.

4.2 Maintain existing gene flow among bull trout populations.

4.3 Develop genetic management plans and guidelines for appropriate use of transplantation and artificial propagation.

5 Conduct research and monitoring to implement and evaluation of bull trout recovery activities, consistent with an adaptive management approach using feedback from implemented, site-specific recovery tasks.

5.1 Design and implement a standardized monitoring program to assess the effectiveness of recovery efforts affecting bull trout and their habitats.

5.2 Conduct research evaluating relations among bull trout distribution and abundance, bull trout habitat, and recovery tasks.

5.2.1 Determine suitability of temperature regimes in currently occupied and potentially restorable bull trout drainages. Areas to explore include the Wolf Fork Touchet and the North Fork Touchet River, where observation of 0 age fry in September 1998 and again in mid-September of 2000, may indicate possible delayed hatching because of the very cold water in this stream.

5.2.2 Determine movement and seasonality of use of different habitat types by bull trout. Research bull trout use and habitat potential in the South Fork Umatilla River and in the mainstem Umatilla River downstream of Meacham Creek, movement and habitat use by Mill Creek sub-adults (9 to 12 inch range); bull trout use and habitat potential in the North Fork Walla Walla River; bull trout distribution and use in the mainstem Walla Walla River from the Little Walla Walla River downstream to the mouth, the South Fork Touchet and the mainstem Touchet River; and the origin and ecology of late emerging bull trout fry in the North Fork Touchet River. Radio telemetry studies in progress by Washington Department of Fish and Wildlife, Oregon Department of Fish and Wildlife, and Confederated Tribes of the Umatilla Indian Reservation will be used to determine timing and overwintering use in mainstem Walla Walla and Touchet Rivers.

5.3 Conduct evaluations of the adequacy and effectiveness of current and past Best Management Practices in maintaining or achieving habitat conditions conducive to bull trout recovery.

5.4 Evaluate effects of diseases and parasites on bull trout, and develop and implement strategies to minimize negative effects.

5.4.1 Maintain fish health screening and transplant protocols to reduce risk of disease transmission.

5.5 Develop and conduct research and monitoring studies to improve information concerning the distribution and status of bull trout.

5.5.1 Examine comment sections in passage logs for McNary Dam for documentation of bull trout or Dolly Varden observed.

5.5.2 Conduct regular surveys in potential habitat where bull trout status is unknown or re-colonization is anticipated.

5.5.3 Complete watershed assessments in the North Fork Walla Walla and Touchet subbasins and identify extent of use by bull trout.

5.6 Identify evaluations needed to improve understanding of relationships among genetic characteristics, phenotypic traits, and local populations of bull trout.

5.6.1 Determine life history requirements of local resident and migratory bull trout populations in the Umatilla and Walla Walla Core Areas. Additional information needed to develop population models that assess population trend and extinction risk include (1) annual abundance of breeders per local population and total for the recovery unit; (2) population structure and connectivity; (3) life history characteristics including age at first spawning, incidence, regularity and timing of repeat spawning, and total life span; (4) reproductive success in production of pre-adult offspring; (5) survival rates to breeding adult; and (6) reproductive success in replacement of breeders. Development and application of models that assess population trend and extinction risk will be useful in refining recovery criteria as the recovery process proceeds.

5.6.2 Investigate connectivity among core area populations in the Umatilla-Walla Walla Recovery Unit and the adjacent Columbia River. Determine existing and potential habitat use in the recovery unit and mainstem Columbia River corridor between the two core areas by bull trout.

6 Use all available conservation programs and regulations to protect and conserve bull trout and bull trout habitats.

6.1 Use partnerships and collaborative processes to protect, maintain, and restore functioning core areas for bull trout.

6.1.1 Support collaborative efforts by local and regional (basin wide) watershed groups and others to accomplish site specific protection/restoration activities. Work with the Umatilla Total Maximum Daily Load stakeholders group to identify actions to address Total Maximum Daily Load issues in Umatilla River downstream of Meacham Creek confluence and with the Umatilla Basin Watershed Council to identify and improve upland and tributary conditions (*e.g.*, Wildhorse and Tutuilla Creeks) to reduce/prevent sedimentation and possible pollutant inputs. Identify opportunities for restoration to landowners; recommend increased technical assistance to landowners; use existing Federal/State cost share programs and incentives to implement actions.

Work with the Walla Walla Total Maximum Daily Load stakeholders group to identify actions to address Total Maximum Daily Load issues in Walla Walla Basin. Work with private landowner to protect spawning reach of Wolf Fork in private ownership.

Support Walla Walla County Conservation District's efforts to restore habitat in Washington. Support local efforts by providing technical support, coordinating volunteers, providing cost-share opportunities to local conservation districts, etc. Participate in the Washington Growth Management Plan to protect critical habitat through land use planning.

6.1.2 Provide long-term habitat protection. Opportunities to protect spawning and rearing habitat, riparian buffers, and instream flows on private lands through purchase from willing sellers,

conservation easement, land exchange or other means should be pursued. Restoration efforts to improve anadromous salmonid production in both core areas can be expected to benefit existing and potential migration corridors and overwintering habitat for bull trout as well as improve their prey base.

6.1.3 Work with county and city agencies to minimize bull trout impacts related to floodplain development. Identify concerns regarding farm and conversions to subdivision to county and city land use planning entities. Make recommendations to control development in the floodplain.

6.1.4 Work cooperatively with neighboring States and Tribal government in watersheds that span interstate boundaries.

6.1.5 Develop and distribute educational materials for public and landowners on bull trout and their habitat needs. Some areas where information is needed include watershed form and function, riparian and side channel restoration, large wood placement, marking storm drains in urban areas, etc.

6.1.6 Work with local communities on education projects. For example, use local media, Blue Mountain Community College, sportsmen groups, civic groups, watershed councils, soil and water conservation districts, Natural Resource Conservation Service, and other entities as information outlets. Contact agriculture groups, (*e.g.*, wheat growers, cattlemen, and Confederated Tribes of the Umatilla Indian Reservation) to assist with educational effort with rural residents. Use Umatilla Total Maximum Daily Load Tables 75 and 76 for guidance, as well as Section 3.5.3 to assist in outreach on bull trout issues.

6.1.7 Explore changes to local, State, and tribal plans to protect springs and non-fish bearing waters. For example, incorporate recommendations of the Independent Multidisciplinary Science Team into the Oregon Forest Practices Act.

6.1.8 Develop a cooperative agreement for instream water rights/minimum flows to protect flows to the Columbia River within the Walla Walla Core Area.

6.2 Use existing Federal authorities to conserve and restore bull trout.

6.3 Evaluate enforcement of existing Federal and State habitat protection standards and regulations and evaluate their effectiveness for bull trout conservation.

6.3.1 Evaluate the Oregon Forest Practices Act and rules relative to bull trout habitat requirements. Assess the effectiveness of current forest practices regulations to protect bull trout habitat.

6.3.2 Review and modify emergency flood repair rules that impact bull trout. Work with Umatilla County, Federal Emergency Management Agency, Oregon Division of State Lands, U.S. Army Corps of Engineers, politicians, U.S. Fish and Wildlife Service, etc.

6.3.3 Review land use plans in Oregon and modify where appropriate. Support changes in land use planing during the current amendment process to protect bull trout habitat.

7 Assess the implementation of bull trout recovery by recovery units, and revise recovery unit plans based on evaluations.

7.1 Convene annual meetings of each recovery unit team to generate progress reports on implementation of the recovery plan for the Fish and Wildlife Service.

7.1.1 Develop a Participation Plan to support implementation in the recovery unit.

7.2 Develop and implement a standardized monitoring program to evaluate the effectiveness of recovery efforts.

7.3 Revise scope of recovery as suggested by new information.

7.3.1 Periodically assess progress toward recovery goals and assess recovery task priorities. Annually review progress toward population and adult abundance criteria and recommend changes, as needed, to the Umatilla-Walla Walla Recovery Unit chapter. In addition, review tasks, task priorities, completed tasks, budget, time frames, particular successes, and feasibility within the Snake River Washington Recovery Unit.